AMERICAN VETERINARY REVIEW,

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EDITORIAL.

PREVENTIVE VACCINATION IN DOMESTIC ANIMALS—OUGHT IT BE MADE OBLIGATORY?

Now that Mr. Pasteur has completed his discovery of the true method of preventing the ravages of the contagion of anthrax, of hog cholera, of chicken cholera and of hydrophobia, it devolves upon the philanthropist and the legislative guardian of the public weal to ponder the matter carefully, and to turn to practical account the conclusions of the labor and research of the great experimentalist. The contemplation of the beneficial results attainable from these discoveries, and the obligations under which Mr. Pasteur has placed society and the state by their promulgation, are vast and immeasurable. The responsibilities resting upon the individual owners of domestic animals are, also, too obvious and weighty to be ignored, and the proprietor of an animal subject to the maladies investigated by Mr. Pasteur can never more be justified for failing to recognize the inoculation whose results are so well and so thoroughly proved. No owner of a herd in a district subject to anthrax can be excused for leaving his cattle uninoculated. No owner of a herd of swine can escape censure—which a just penalty should follow—for neglecting their vaccination. And last, but not least, how can the owner of an animal subject to hydrophobia be forgiven for his criminal cruelty, who suffers such a creature to run at

large among his neighbors, because wantonly overlooking the discoveries of Pasteur?

We are quite aware that in venturing these remarks and putting these questions, we are exposing ourselves to a great deal of criticism, and that we may even be accused, as Mr. Pasteur has already been, of attempting to "make a corner" in vaccine! But—to adhere to the true matters of the issue—what difference can there truly be between pleuro-pneumonia and the diseases named; and what, (if we may be allowed to strain the comparison somewhat) between the fearfully contagious and infectious disease of smallpox, and the no less frightful and commonly fatal anthrax; or still more, the irresistible and deadly hydrophobia, that they should be discriminated in devising and applying measures and methods of "crushing out" the evil common to them all? It is true that these affections of our domestic animals are not very frequently communicated to man, and this may be a reason for failing to make vaccination obligatory, as it is in the case of smallpox. But why is it made obligatory in some of the countries of Europe, for contagious pleuro-pneumonia? It is not done because of its dangers to man, but because of its dangers to the national wealth. Hog cholera kills hogs by thousands every year, and the loss in money reaches millions of dollars. There is no good reason, no excuse even, for this. Anthrax, either in its bacteridian or bacterian form, carries away annually hundreds of our fat cattle, and besides the pecuniary loss to individuals and to the nation, exposes many human beings to long sickness and possible death. There is also no reason for this. Hydrophobia kills, perhaps, a less number of animals, but when it attacks one, it not only irrevocably seals his doom, but as long as he lives exposes to certain death every man, woman or child who may come in contact with him, when attacked at last. And now that we know that for this disease, as well as for the others named, there are means of prevention—that inoculation will insure immunity—why do we longer hesitate or doubt? We are sure that the question may be wisely put, both from the point of view of the protection of human life, and from that of the economies of our national wealth. Does

it not then become the imperative duty of our sanitary legislators to make the vaccination of our domestic animals, to a certain extent, obligatory, just as it is for our own species; at least under such peculiar conditions of sanitary precautions and requirements as may upon further discussion be found necessary?

CONTAGIOUS DISEASES IN THE UNITED STATES AMONG DOMESTIC ANIMALS.

A general examination of our agricultural papers reveals a sad state of affairs relating to the prevalence of contagious diseases of domestic animals in the United States. It is not now, as it was but a few months ago, when the bovine scourge of contagious pleuro-pneumonia alone prevailed alarmingly, although this still continues to occupy a large space in the columns of the veterinary department of these journals, but it is glanders; it is anthrax, in its various forms; and it is hog cholera, of which the evil tidings come.

There is no doubt that pleuro-pneumonia is the one which seems mainly to call for immediate action, for there is against this but one prophylactic measure; the only means of effecting its extirpation is the radical process of stamping out.

The process of inoculation, with all its advantages, is not without objection; though, after all, there is not the same danger to human life in pleuro-pneumonia that accompanies glanders; and every one is aware that this disease is to be found all over, regardless of locality, and that occasionally a case of infection by a human being is reported. It is true, that it is rare, but is not a single case sufficient to show its dangers, and to establish the necessity for urgent preventive legislation? And again, how shall our duty in relation to hog cholera and anthrax be performed, and when shall we begin to see about it?

The subject of sanitary veterinary medicine and legislation is one that our National and State governments can no longer ignore? The National Convention of Cattle Growers which met recently will certainly not ignore the importance of these subjects, and it is to be hoped that their action will result in some practical plan by which the power of combating and controlling these domestic

pests will be committed to the hands of men educated to know and competent to direct in the matters in hand.

VETERINARY EDUCATION IN AMERICA.

The various questions relating to veterinary education which were agitated at the meeting of the Ohio State Veterinary Medical Association, and to which the attention of our readers was called in our last issue, seem to have been overlooked by our friends. Our call for suggestions and opinions on this important subject has, therefore, quite failed to receive from our fellow veterinarians the attention it deserves. We have asked for an expression of opinion, and have offered the hospitality of our columns to all who might feel inclined to occupy them, and still our invitation is quite without response. We have said that the subjects discussed deserve close attention, and an evidence of this is found in the remarks that are made in the best agricultural publication of the country.

The *National Live Stock Journal*, in an editorial on October 20th, publishes an excellent article on this question, which well merits the attention of all interested persons. The questions of the veterinary calling, veterinary colleges, and veterinary education is one which concerns every American, and in which every practitioner is interested, and any opinion on so important a subject should meet with careful consideration. Veterinary colleges are becoming plentiful in the United States, but it must not be forgotten that not quantity, but quality, is the thing needed. Veterinary education may be good and thorough in one, but deficient in another, as in other departments of science. A regular and proper standard is the desideratum in the case, and counsel and suggestions from all will be necessary to secure the most advantageous results to all. As remarked by our contemporary, "Millions are annually involved in a satisfactory veterinary service, and in view of the general demand for more efficient and national contagious-diseases legislation, the entire subject is particularly important at this time." Once again we would ask for the opinions of our colleagues on the three suggestions involved in the letter of Dr. W. C. Fair, published in our November number.

CONVENTION OF VETERINARIANS AT CHICAGO, NOVEMBER 16, 17 and 18, 1885.

This meeting of veterinarians was called to suggest to the National Cattle Growers' Convention the best method of dealing with contagious and infectious diseases of domestic animals, and to assist in shaping future legislation in reference to the same.

The results of this convention cannot be said to have been all that were desired. There was much time wasted in personal matters, criticism of existing methods, etc., etc.

To every thinking veterinarian there can be no doubt but that under the existing imperfect laws, while much good has been accomplished, there have been sins of omission in many instances. To a great extent these have been unavoidable, and even were this not so, comments at such time and place must be considered as ill-timed.

The convention was practically a unit upon the necessity of *National legislation*—as States have in almost every instance failed to eradicate or even control outbreaks of communicable diseases, without aid from the general government. It is a matter of great regret that a few veterinarians present advocated the practice of inoculation for contagious pleuro-pneumonia, and that others declared that so called "recovered cases" cannot communicate this disease to other cattle. Inoculation is not to be seriously thought of in any country where extermination is possible; nor can we ever expect to be rid of contagious pleuro-pneumonia so long as "recovered cases" are allowed to mingle with healthy animals. These two positions have been so thoroughly established, so frequently proven, that it is a painful surprise to everyone to hear them even mentioned at this date.

In dealing with purely exotic plagues, veterinarians who are influenced by such opinions are certainly not those to be trusted during the present crisis.

Given the proper legislation and moneys, contagious pleuro-pneumonia can now be effectually stamped out of the United States. But this will *never be accomplished* if we inoculate, or preserve in our midst "recoverd cases," to slowly but surely continue the plague.

Improvements of our quarantine stations were declared necessary in order to prevent future importations of contagious or infectious diseases. Such improvements will follow when better laws and a sufficient amount of funds are provided.

The organization of a National Veterinary Sanitary Board was urged, and a committee appointed to draft constitution and by-laws, to be presented at the next meeting of the convention. If this can be accomplished, veterinary medicine will have taken a long stride toward the place she deserves to hold in the political economy of this country. C. B. M.

CORRECTION.

In our November number, at the sixth upper line of page 272, the word "medical" ought to be replaced by the word "veterinary."

ORIGINAL ARTICLES.

DISEASES OF THE HEART IN DOMESTIC ANIMALS, ESPECIALLY THE HORSE.

By Fr. Blazekovic.
(*Translated by J. C. Meyer, Sr., V.S.*)

Continued from page 300.

Carditis and Myocarditis.

The injection of the inter-muscular tissue is considerable at the outset, characteristic ecchymotic redness appears very soon; the affected parts are dark colored, and, by the fluid effused in the cellular tissue they become softened, swollen and of a tawny color. Such smaller or greater dispersed deposits are spread over the greater portion of the section of the heart, and often affect the wall of the heart in its entire thickness. In traumatic myocarditis such spots are most numerous in the immediate vicinity of the injured part. In such case the pointed foreign body which penetrated the heart and reached here through the diaphragm and pericardium from the reticulum, becomes enclosed by a solid fibrous capsule in the muscle of the heart; still there are always such changes to be found which characterize the traumatic

pericarditis. The point of the foreign substance is either surrounded by coagulated fibrin and projects freely in the cavity of the heart, or it presses against the opposite partition of the lining, which is rent in consequence of the point gliding up and down during the normal action of the heart.

The more circumscribed the myocarditis is, the more numerous are the above described spots. The usual termination of the same is induration, formation of callous scars, or suppuration. Upon the cadaver of the horse callous scars are often found as marks of protracted inflammation of the heart; they are either ramified, or solid white callosities of various dimensions, taking the place of the muscle of the heart. In the latter form they appear most frequently in the left ventricle toward the apex; they are then not as thick as the wall of the heart, sometimes bent outward, forming a circumscribed aneurism of the heart. Undoubtedly such pouch-like projections are still formed in the stadium of saturation as the result of a circumscribed inflammation, and before the callous formation which seems to be brought about in the stadium of fatty degeneration and mollification.

The issue of myocarditis into callous hardening often extends to the inner part of the wall of the heart, otherwise to the outer part with the pericardium, or to the entire wall of the heart in its whole thickness, including pericardium and endocardium. Such extended callosities which penetrate the entire thickness of the muscle, influence not only the increase of the positive enlargement of the cavity of the heart ushered by the inflammation, but especially the formation of the above described pouch-like expansion, the true aneurism of the heart.

The termination of carditis into suppuration is not so frequent, and is manifested by the presence of small abscesses in parts of the relaxed and discolored muscle of the heart. Especially are such cases known in the dog. These abscesses, which vary in size from a pea to a penny, are filled with thick yellow pus, and occupy the whole thickness of the wall between the outer and inner membrane, and by very small openings perforate the inner or outer wall of the heart; more frequently the inner. The flesh around the heart is always pale, very tender and soft. The form

of such ulcers is generally irregular, forming shoots and protuberances in different directions. If the abscess be not obliterated by inspissation and chalky formation of its contents by being capsulated and absorbed before paralysis of the heart occurs, then rupture and destruction of the wall of the heart produce the fatal issue of this degeneration. Metatastic abscesses in the liver, spleen and other organs are proofs that this condition of things is the result of pyæmic processes.

Hypertrophy of the Heart.

Hypertrophy of the heart is such a condition of the heart in which a conspicuous increase of the muscular substance of the heart is formed and is characterized by an abnormal enlargement of this organ. Such anomalies of the heart are frequently found at post-mortem examinations; these are partially confined to single portions of the heart, or they may extend over the whole organ. It appears that the left half of the heart is oftener affected than the right. Such a hypertrophical part of the heart is generally of a dark color; the texture is more solid and the primitive bundles are thickened, in fatty degeneration often pale and tender.

From the various results we are able to divide hypertrophy of the heart according to the synchronal capacity of the cavities of the heart into

(*a*) Simple hypertrophy, without diminution oft he capacity of the cavity of the heart.

(*b*) Eccentric hypertrophy, with expansion of the cavity.

(*c*) Concentric hypertrophy, with contraction of the cavity.

In simple hypertrophy the walls are simply thickened without expansion of the cavity. The greatest number of cases are found in eccentric hypertrophy, which affects the ventricle as well as the arteries, but mostly those of the left half of the heart. They usually appear in one part of the heart and gradually spread over the other parts. Under such circumstances the expansion and enlargement of the heart can become very great. Thus the long and short diameter of the heart becomes so large that it often attains an enormous circumference of round, plump form.

The occurrence of hypertrophy of the right half of the heart is rare, and is restricted to the ventricle and auricle.

The eccentric hypertrophy always results in enlargement. It consists of the passive enlargement, mostly of one part of the heart, accompanied by attenuation of its walls. The muscular substance is now normal, now soft, easily lacerated, fatty degenerated, pale, or of a dirty yellow color. It can attack the right auricle and ventricle. If it occurs at the same time with the eccentric hypertrophy of the left ventricle, the heart exhibits a considerable enlargement of its circumference, and the walls, which are relaxed, collapse quickly after the emptying of the blood.

Simple expansion is an enlargement of the cavities of the heart with unchanged thickness of its walls. This condition can only be conceived with a relative hypertrophy of the walls of the heart, since otherwise, in consequence of the expansion of the walls of the heart, these would necessarily grow thinner. The larger the hypertrophied heart, the more abnormal will be its position. Occasionally it hangs toward the left thorax, often nearly diagonal, with the base toward the right, the apex toward the left, touching the lobes of the lungs and the diaphragm.

Texture, consistency and color vary considerably. The color is dark brownish-red, the consistency often perceptibly increased, the texture, however, only apparently normal. The color of the suffering ventricle is of a murky blue, running into the yellow. This color appears either in spots or through the whole diameter. At the same time the consistency is modified. The wall of the heart is resistant and firm; the muscle, which has lost its former solidity, becomes brittle and tender. The change of texture existing thereby is regarded as a form of fatty degeneration, which often appears as an accompanying disorder of the hypertrophy and develops in the already hypertrophied heart, and then promotes expansion, also spontaneous bursting of the part of the heart concerned. Purulent infiltrations are found quite frequently in the muscle and on the surface of the enlarged part of the heart, which are regarded as residue of a previously existing inflammation.

The form of the hypertrophied heart is often influenced by the separate divisions of the heart in different ways. If the left ventricle suffer, which is most frequently the case in eccentric hypertrophy, the heart generally appears long, conical or cylindrical, seldom round or broad; if, on the contrary, the right half of the heart be thus attacked the heart increases in its breadth diameter. The inner lining of the heart is often found hypertrophied in the left heart, (auricle), frequently in the semi-lunar shaped aorta and bicuspid valves. Such hypertrophy is generally conditioned by the new formation of cellular tissue which proceeds from the inner membrane. In the beginning it is soft, later tendinous and cartilaginous, and finally it can become ossified. The valves then are thickened, turned at the edge; their ganglions quite prominent, sometimes grown together with their angles closing the aorta partly or completely,—they are insufficient—in consequence of atheromatous degeneration, rough and uneven on the surface, coated with a fibrous coagulation. This condition is for the most part the result of inflammation of the valves. The bicuspid valves become hypertrophied by thickening of the cellular tissue.

Atrophy.

Atrophy of the muscles of the heart is rare among domestic animals. If it takes place partially, it appears as an attenuation of the walls of the auricle; especially is this the case in horses. The muscular substance is but slightly changed; now it is pale and tender, then of a darker color and more solid in consistency. The primitive bundles are simply atrophied, without other changes in texture, often at the same time fatty degenerated.

We divide atrophy into simple, with unchangeable space of the cavities of the heart; into concentric, with diminution; and into eccentric, with enlargement of the circumference of the heart. The diminution of the heart can be caused by steady pressure from without; for instance, a barb-like mass capsulating the heart, or fluid exudations after an inflammation, can produce such a pressure. Sometimes the heart appears atrophied after a long exhaustive illness. In a mild form of the disease the free edge of the valves thicken; later they also thicken toward the

base, are of a yellowish-white color, less movable, shortened and shriveled. The inserting tendinous cords of the valves are now unchanged, now shortened, causing insufficiency.

Enlargement of the Heart.

The enlargement of the heart is synonymous with eccentric hypertrophy; still expansion without hypertrophy is also present. Sometimes with passive dilatation the heart attains a considerable circumference. Cases of developed total enlargement are not very numerous. More frequently is the vena cava at the aortic ventricle greatly expanded. Sometimes hypertrophy is united with atrophy of other divisions of the heart so that different changes in volume appear combined.

Expansion of the heart takes place more frequently diagonally than perpendicularly, whereby it attains a rounded broad form. By extension united with atrophy, the change of the substance of the heart is mostly uniform and often reaches such an astounding reduction in substance that it can be scarcely believed how such material could carry on its function. The muscle of the heart is sometimes colored purple-red, dark brown-red, at the same time relaxed in a high degree, tender and easily lacerated; the walls of the heart collapse after they have been cut open. If softening and attenuation of the muscular substance be present, this produces the immediate cause of rupture.

(*To be continued.*)

THE HORSE'S FOOT.

By W. Bryden, V.S.

All domesticated animals have special qualities which make them useful or valuable, and just in proportion as such qualities can be developed by cultivation or training do certain breeds or individuals rank above their fellows.

In a state of nature such animals are just what their surroundings make them. Although they may be coarser in form, yet there is a rough harmony in their organization which adapts them to the circumstances their existence demands, and if the test could

be applied it would possibly be found that the average physically, of a herd of wild animals, would be little below that of an equal number of those reared in domestication.

In the horse, strength, endurance and locomotion are indispensable qualities. They have not the "royal brain" of man, especially when educated to supplement inferiority of organization, consequently, although we may find among them individuals superior to any found in a wild state, yet we also find many lower down in the scale—some links in the chain are so weak, that as a whole it is worthless—chiefly from inferiority in the character of their locomotive organs.

When youth, with its natural habits and the freedom then enjoyed, is exchanged for the restraints that follow, they become more subject, not only to such diseases as result from changes of temperature and of food, but their feet, from the liability of the *hoofs* to acquire growths that are undesirable, are affected adversely by the new surroundings.

Defective form of the hoof, Dr. Fleming says, causes "not only disturbances in the direction of the limb and its movements, but considerably modifies the growth of the horn." From the nature of its tissues, the important functions required of it, and the variety of circumstances under which it is grown, we find a variety of different forms and qualities, some healthy, many defective. Among those that may be classed as healthy we find, for example, large hoofs and small hoofs, with modifications of each within the range of soundness, and just as such hoofs determine the differences in the character of the limbs when healthy, do those that are defective determine the particular diseases the limb is liable to be affected with It is the medium through which the influences of different surroundings are exerted in a right or wrong direction, and the medium through which restorations can be accomplished, even without the aid of applications to other parts. A knowledge of how to manage and cultivate this remarkable organism is therefore indispensable to the attainment of perfection of physical organization in these animals, and as such knowledge can only be acquired through a careful study of its history and the influences that affect its growth, we will

examine as briefly as possible some of them. Proof of its significance is nowhere more forcibly presented than from its pre-historic history. In those remote ages, as an excellent friend has shown me, *it resembled a paw*, adapted to floundering about on the soft, swampy, lacustrine ground peculiar to a very remote period, but as the earth surface became harder and drier a corresponding change became necessary in the extremities, the hoofs began a gradual process of development, which in turn modified not only the form and character of the limbs, but all parts of the body as well.

Farther evidence of the influence the character of the soil exerts is to be found in the present great variety of hoofs, each peculiar to different sections of country.

We are told that "about the third or fourth month of fœtal life the hoof begins to form under a soft gelatinous substance, which at birth soon wears off, disclosing the sole, wall and frog already formed." Among the influences that affect it in its future history are: *Parental Characteristics*—the shape and capacity of the pelvic cavity and adjacent parts of the mare; the health, especially of the mare, whether the subject of rheumatoid or other diathesis; whether a sufferer from accidentally diseased or deformed limbs, inducing possibly, abnormal reflex effects, the position of the limbs in utero, accidents during parturition, etc.

The other influences that I will call your attention to are: *Time of Parturition*—whether the foal at birth is kept for weeks or months on a dry stable floor or other unsuitable place, or in pasturage, such as nature intended and the delicate little hoofs required. Whether reared in the north, with the usual six months of imprisonment each winter, or further south, where plenty of outdoor exercise can be had all the year round, so essential to muscular development and insuring an amount of *tear* and *wear*, without which no hoof can possibly be strong and hardy. The quality of such tissues as the skin, hair and hoofs, whether coarse or fine; the climate, whether wet or dry, cold or hot; the soil, whether low meadow or dry upland. There is still another influence demanding careful study—*Heredity*.

No one can deny the importance of this subtle agency,

which in its application to the diseases of the horse's feet and limbs has often been exaggerated and misunderstood, attributing to it what really belonged to other factors. In a single individual this mysterious process may exert itself in both a right and wrong direction. In the offspring of one combination it may be most pronounced, while in still another apparently more obnoxious, it may be so *dilute* as to be hardly recognizable. A young animal bred from parents having diseased hocks or defects, such as spring-halt or pacing, when found to be similarly affected, would seem to be *prima facia* evidence of hereditary transmission, but when we reflect that such animal having been brought up under precisely similar conditions and surroundings as its progenitors, it would be quite remarkable if it did not develop somewhat similar undesirable characteristics. A shrub by the seaside, if exposed to the full sweep of the ocean's gales, has its limbs all on one side; the same shrub if grown further inland and less exposed, would have its branches evenly arranged. A mare suffering from spavin, for example, has in addition to the changes in the foot and limb, a condition of the whole quarter that renders her less robust than if perfectly sound. The gluteals are changed, the hip is dimpled, the pelvis is twisted, the tail is carried to the affected side, the genitals are softer, æstrum is often irregular and impregnation accomplished only after repeated trials. The young of such an animal may not necessarily be spavined, but being less robust than if from sound parentage, is more liable to be affected adversely by the influences to which it is exposed.

Many of these processes that at first glance appear mysterious are found on closer acquaintance to be capable of easy comprehension; it is therefore of the utmost importance that we try to arrive at something like the exact proportions of a subject like this, neither undervaluing nor over-estimating its wonderful significance. Having already intimated "that many districts have hoofs characteristic of the locality in which they were grown, with limbs and general conformation to correspond, and that diseased limbs have hoofs characteristic of the disease," it does not appear to me to follow that because a horse born and brought

up in Maine becomes spavined or deformed in his limbs, he would, if brought up in Kentucky. Neither can I perceive why a herd of horses, male and female, ringboned, spavined and otherwise affected with diseases peculiar to their limbs, if turned loose in a country suitable for their continual existence, should not produce offspring that would in time be entirely free from such diseases.

Before we can properly guard against undesirable changes that domestication brings about, those to which each type of hoof is most liable require to be carefully studied and classified; for example, the large round hoof from some parts of the West was adapted to the locality from which it came, and the only kind possible of production in such a district when not interfered with. Yet its low sole and frog, large enough to take up one-third the area of the sole, although a delight to all admirers of large frogs, is ill-suited to our hard streets, from its being *too wide*. It is, therefore, of great importance that we know how to guide this living structure in the mature animals as well as in the young, so as best to *acclimatize* it gradually and fit it for its new requirements, instead of in a hap-hazard sort of way trusting to old nature to make unaided the desired changes.

Whether the heels expand or contract when the weight is thrown on them has often been discussed, and pages have been written on the subject. That the short wide hoof spreads at the heels there can be no doubt, and it is not disproved by the fact that in toe crack and quarter crack, the edges come together when the foot is placed on the ground; still there is a class of hoofs with heels wider at the hair and narrow below, that may come together, or at least resist the expansion.

It may be said in opposition to this view, that the hoof determines the character of the diseases peculiar to the limb; that it is the limb that exerts the adverse influence on the hoof. That there is some reciprocity between them may be admitted, but, if we take as an example, a leg that has been accidentally cut or bruised severely in some important part, causing the foot to be held suspended for a long time, the hoofs will change in the direction to which its form predisposes it, and when the injury has got well, if the hoof has become imperfect, it will react on the

limb, *not by reopening the sore*, but by inducing the diseases peculiar to it.

On a limb predisposed to curb it might be impossible to produce a spavin, while there are others again so well organized, that it would be impossible to produce any disease on them. A rare commodity, but one, it is to be hoped, we may see more of.

Some growths of the hoof interfere with the circulation, either by crowding the secreting structure or otherwise injuring the sensitive tissues within, and cause such diseases as thrushes, corns, quarter-cracks, toe-cracks, seedy toe or quittor. *Peripheral disturbances* and *pain* may be induced; both react on the limb, either directly or by reflex action, causing imperfect or unsymmetrical organization, which in turn tends to equivocal action or gaits, such as pacing, spring-halt, hitching, interfering, over-reaching, paddling or stumbling; to deformities, such as ringbones, spavins, splints, curbs or atrophy of some part; the column of bones becoming distorted and changed from the changes in the muscles, tendons and ligaments.

The development of a projecting bone-spavin appears to me to be somewhat analagous to the physiological development of projecting apophyses, as described by Marey; one is normal, the other is abnormal; in one we find the insertion of an important muscle, tendon or ligament, while the other might result from the metatarsal flexor—although sound—doing more than its share of work on account of the incompetency or change in other parts; or from atrophy, it having become shortened so that at every step it is overstrained, the ligaments or subjacent tissues being also involved.

In a similar way I will take the liberty to suggest an explanation of the peculiar movements in spring-halt, as when an important muscle becomes atrophied or changed so that its functions are not performed in harmony with the rest.

Growth of the whole or any part of an animal, if arrested for a sufficient length of time between birth and maturity, can never be fully recovered, whereas, after maturity, a part may atrophy or degenerate and again be restored; it is important therefore, that we recognize the necessity of placing the young animal unde-

the most favorable circumstances for the even development of an organism so far-reaching in its influence as the hoof. It can never be grown as a hot-house plant, but must have constant *tear* and *wear* on suitable ground; this is an indispensable factor in its cultivation. This the breeder must fully understand; some parts of his farm may be as unsuitable for his colts to run in as a swamp would be for wheat, and yet he may have within its limits fields admirably suited to their wants, if judiciously used; if to this is added a knowledge of when to use the rasp or paring knife, with perhaps some simple application, less will be heard of heroic operations, fiery tortures and the mysterious remedies of the past.

I think it is Herbert Spencer who says: "We want all facts which help us to understand how a nation has grown and organized itself." This applies as well to the horse's feet. I sincerely hope that the study of this subject will be taken up by the profession with an enthusiasm which will lift it to the position its importance demands, and that it will be thought worthy of the best efforts of our brightest men.

MICROBES AND CONTAGIOUS DISEASES.

By M. Trouessart.*

The parasitic theory of contagious diseases is far from obtaining the assent of all medical men. In fact, it has thus far encountered strong opposition from men high in authority, who have become the champions of the counter theory of the inneity of diseases. In their view, disease develops itself spontaneously, or at least, under the influence of a contagium whose nature is yet unknown. They hold that when microbes are discovered in the blood of patients, it is only as a secondary complication; they are not the cause of the disease, and are neither the contagious

* From the *Revue Scientifique*, Feb. 26, 1885.

element nor the vehicle of the contagium. In a word, the microbian theory is a purely gratuitous assumption.

Let us admit this, and compare it with the other theories which have been proposed to explain the virulent and contagious nature of some of the forms of disease. This comparison may somewhat enlighten the question.

The value of a hypothesis is measured by the number and importance of the facts which it clearly, precisely, truly and scientifically explains; as well as by the progress which it has aided science in securing. Let us then pass in review some of the various theories proposed in explanation of the origin of virulent and contagious diseases, while excluding the intervention of microbes.

The theory of blastemas of Mr. Robin.—Though this gentleman, so far as we know, has never published anything in relation to his opinions as to the value of the microbian theory, some of his pupils have made known the theory of their master in certain publications issued within the last ten or twenty years.

In Mr. Robin's view, all cells do not originate from other cells, in the form of granulation, egg or spore. *Spontaneous generation,* due to the action of elements essentially *mineral* in their nature, it is held, does not exist; but this generation or genesis takes place every day, at the expense of an organized and living, though liquid and amorphous matter, which is derived from other pre-existing cells. It is this liquid that Mr. Robins calls *blastema.* This proceeds from the excess of nutritive cells, or organized substance, which these cells exudate around them, and by which new cells are formed, complete, at the expense of this blastema, without taking more from one cell than another. It is thus according to Mr. Robin, that pus corpuscles are formed, which are a new creation, and are the result of the organization of a liquid exudated in all the organs, and is not the product of the swelling alone, or of the proliferation and granulating of cells already existing, as admitted in some theories, especially those of Schiff and Cohnheim.

This admitted, the origin of all the diseases will consist in a chemical or physiological alteration of the blastemas, which will

at times produce normal cells, to replace those that die by the natural wear of organs, and again give birth to other cells, diseased and dangerous, either by their excess in number, as in purulent infection, or by their special nature, as in cancer and tubercle. But let Mr. Robin speak: "The cause of morbid troubles is due to changes that take place in the quantity and nature of the immediate principles of the true substance of tissues and humors. *These are the alterations which render possible the growth of spores of very small size.* The multiplication of microscopical vegetables is an epiphenomenon, and not the producing or even scientific cause. *The presence of the vegetal parasite is a* complication mistaken for a cause."*

This was written some thirty years ago, and one may be allowed to ask if the immense progress made since that period has not modified this opinion of the author? Has Mr. Jousset de Bellesme, then, any right to use and interpret it, as he does, as follows: "The microbe, when it really exists, is only an epiphenomenon, and it would not be saying too much in stating that no new element intervenes in variola, nor in scarlatina or tuberculosis, but that *in these cases there are only exaggerated proliferations of normal elements, which,* UNDER THE INFLUENCE OF CONDITIONS ENTIRELY OBSCURE, develop themselves in an entirely uncommon manner." * * * * * *

The definition given by this gentleman is not that of contagious diseases, but on the contrary, that of diseases which have been classified under the vulgar and general name of *cancers.* Does he assimilate these diseases together? This assimilation is impossible; every one knows that cancer is not contagious; this single fact puts an abyss between the two kinds of diseases. Cancer is not only neither contagious nor inoculable, but is hereditary in only about *one* case out of *ten.* The contrary is the fact for tuberculosis, a contagious disease, *because* it is *a microbian* disease, and may be said to be hereditary in nine out of ten cases.

The theory of Mr. Jousset de Bellesme, consequently, explains nothing and avoids the question; saying nothing of the

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* *Natural History of the Vegetal Parasites of Man,* 1884.

essential points in question, viz: contagion and virulency. Let us now return to Mr. Robin's theory.

In saying that the microbe developes itself in altered tissues, he is not so far from the parasitic theory as his pupils seem to suppose. It imports little if the microbe is a complication, an epiphenomenon, if this secondary condition dominates the entire disease, and gives to it its dangerous character and its contagious and virulent nature. In the wound of the serpent it is not the bite of the teeth of the animal that makes it dangerous, but the introduction of the venom which accompanies it, or the "epiphenomenon;" and the same thing exists in the anatomical wound.

Two men are affected with pneumonia in the same circumstances; one recovers easily, because he is but thirty years old; the other will almost certainly succumb, because he is seventy-five. Will it be said that he dies from old age, and that pneumonia was only an "epiphenomena?"

Oidium and phyloxera destroy vines exhausted by improper cultivation; will it be said that oidium and phyloxera are not two serious diseases, and that they are only "epiphenomena?"

It is then evident that Robin's theory, as presented by his pupils, is no longer on a level with science, and at least is not applicable to virulent and contagious diseases.

Theory of Mr. Charlton Bastian and English physicians of his school.—This, the theory of the most ardent opponents to that of Tyndall and Pasteur, is found elaborated in the writings of Lewis and Lionel S. Beale. It differs but little from the preceding. According to Lewis, "it is evident that the mycrophites of the blood are only epiphenomena; that the changes of the liquids of the body take place before the slightest trace of their presence can be found."* This, evidently, is Robin's theory.

Beale is more exclusive and absolute.† With him, the solid particles of vaccine are not bacterias or micrococci, but *bioplasts*, or elements derived from the living matter of the cow, and these bioplasts constitute the effective contagiums of all virulent dis-

* *Microphytes of the Blood*, 1881.

† *Microscope in Medicine*, 1882. Fourth Edition.

eases. Bioplasts are very small particles of the living matter of the species infested by disease. Contagium is a *bioplasm*, and "each species of contagious bioplasm manifests its specific and proper action, and that one only." We leave it to others who care to do so, to admire, and are able to appreciate this jargon scientific, which seems to carry us several centuries back; but we may remark that it somewhat resembles another theory, more serious and more complete, which we will now consider.

The theory of the microzymas of Mr. Bechamp.—In this it is not a liquid blastema which is modified in the diseases, but an organized and solid blastema, comparable to blood and constituted of very small particles of living matters, which are the *microzymas*. These are those elementary granulations which are seen under the microscope in cells, and in all the liquids of the economy; it is these, and not the cells, in which they are encysted, which are the true agents of all the functions of the organism. It is by secreting a liquid called *zymosis*, or ferment, which continuously surrounds them, forming, with them, that whole called *protoplasm*, that these microzymas undergo the various changes, the end of which is the nutrition of the organism. It is not parasites from outside which produce virulent and contagious diseases, but the microzymas themselves, by a perversion of their normal function. They then secrete a bad zymasis, and are transformed into bacterias and micrococcci, which are wrongly taken for foreign bodies, when they are only the result of a peculiar evolution of the microzymas already existing in our tissues.

But that is not all; these microzymas do not die. In our organs cells die, and are renewed; but the microzymas which they contain only unite to others and form new cells. After death, it is these which, by their transformation into microbes, produce putrid fermentation, and their existence lasts far beyond that of the organism to which they temporarily belong. Thus the microzymas of chalk, which no doubt arise from the tissues of animals and plants at the time of its formation, after a rest of several thousand centuries, are still living and susceptible of transformation into bacteria, when a proper nutritive liquid is

given to them, as was demonstraed by M. Bechamp.

This theory is undoubtedly attractive and explains many more facts than the preceding; but there are many others which do not agree with it, while the parasite theory explains them easily; such for instance, as the phenomena of cadaveric putrefaction, and the good effects of Lister's dressing, or the closing of wounds of Mr. Guerin.

Mr. Robin, in his theory of blastemas, admitted also that the cadaveric putrefaction was taking place without the introduction of any external agent.

But it is known to-day, that cadavers protected from germs of the air become mummefied, without putrefying. Such also is the case with bodies that for centuries have been left in some of the underground vaults of some churches, and which without antiseptic preparation, have been slowly mummefied. Many of these underground places, where the air is dry and of an even temperature, present conditions essentially favorable to mumefaction, because of the fact that they are unfit for the life of low vegetable organism.

The theory of the microzymas explains the transmission of diseases by the filtrated elements of viruses, when the filtrated liquid of that same virus is without danger. From this point of view it is more in accordance with the facts than the theory of blastema, but it does not explain the effects of the closing or the swifting of the air in the dressing of Mr. Guerin, nor those of phenic acid in the Lister dressing. Indeed, if the virulent microzymas are in the body of patients and do not come from outside, it is difficult to understand the use and advantages of those dressings. Evidently the swifting of the air, which arrests only *its solid particles*, and allows the air itself to go through, acts then only in arresting *something* which was in suspension in the atmosphere, and that *something* is nothing else but the figured organisms or the germs of the air.

(*To be continued.*)

LECTURE ON BACTERIOLOGY.*

DELIVERED IN THE MEDICAL DEPARTMENT OF THE UNIVERSITY OF THE CITY OF NEW YORK, OCTOBER 14, 1885.

By Alfred L. Loomis, M.D., LL.D.

Gentlemen: Before commencing the history of the so-called infectious diseases, I will invite your attention to a brief consideration of those low forms of life which have become known to our every-day literature as Bacteria. The scientific world is at present devoted to their study, and it is a subject of especial importance to us in commencing our studies of the etiology of the class of diseases which are about to engage our attention.

If bacteria are active elements in the production of pathological conditions, their biology becomes a matter which must concern every progressive medical investigator. If, on the other hand, as many are inclined to believe, they have little or nothing to do with the causation of disease, it equally becomes us as intelligent men to investigate, and if possible, determine their real significance. At different periods in the history of medicine different theories have been advanced, and for a time have held the minds of the profession, to account for the causation of disease, as well as for the peculiar phases which it assumes during its active progress.

There are at present two prominent theories in regard to the infections which produce disease. The first is based upon chemical processes; the second upon the multiplication of living organisms. The chemical theory maintains that after the infectious element has been received into the body it acts as a ferment, and gives rise to certain morbid processes, upon the principle of catalysis. The theory of organisms, or the germ theory, maintains that the infectious elements are living organisms, which, being received into the system, are reproduced indefinitely, and excite morbid processes which are characteristic of certain types

*Reprint from the *Medical Record*.

of disease. This latter theory so readily explains many of the facts connected with the development and reproduction of infectious diseases that it has been unqualifiedly adopted by a large number of investigators. The proofs of this theory had not, however, advanced beyond the demonstration of the presence of certain forms of bacteria in the pathological changes of a very limited number of infectious diseases, until February, 1882, when Koch announced his discovery of the tubercle bacillus, since which time nearly every disease has its supposed microbe, and the race is indeed swift in which the would-be Kochs press forward with new germs for public favor.

It is my purpose this afternoon to pass in rapid review the subject of Bacteriology, noting first the different genera, their biology, etc., and the modern means employed in their study. In referring to the practical study of our subject, I shall do little more than describe very briefly the processes as employed in our own laboratory of biology. Here you will find every means for investigating this subject, and I hope you will avail yourselves of the facilities offered for practical work.

The term *bacteria*, or *microbe*, refers to minute particles of matter, microscopic in size, which belong to the *vegetable* kingdom, where they are known as *fungi*. If we examine a drop of decomposing urine under the microscope, amplifying say four hundred diameters, the field is seen swarming with minute bodies, some mere points, others slightly elongated into rods, all in active motion, rising, falling, oscillating—a ceaseless confusion. If the water be allowed to evaporate, all becomes still, and the slide seems covered with mere dust. Apply a drop of water, and after a short time the little, dried-up granules again show their activity, as though nothing had intervened to disturb their vocation. Similar minute forms are seen in every decomposing fluid, often in the blood and sputum of healthy persons. The air is full of them; the dust of our dwellings abounds with their spores in countless numbers, only awaiting suitable conditions to start into active and rapid reproduction. As I have said, certain forms are found in the blood of healthy persons, while other forms are found in the blood of disease.

All these different organisms have become familiar to us under the generic term *bacteria*, which is a very unfortunate use of the term, as it really applies to only a single class of *fungi*. Cohn, whose classification I think is the simplest and the best, calls them *schizomycetes*, and makes the following classification:

CLASSIFICATION OF SCHIZOMYCETES (BACTERIA).—1. *Sphero-bacteria*, or micrococci. 2. *Micro-bacteria*, or bacteria. 3. *Desmo-bacteria*, or bacilli. 4. *Spiro-bacteria*, or spirillæ, spirochetæ.

I will now briefly refer to the more important features of each of these classes.

First, of *sphero-bacteria*, or micrococci. This is the simplest of the fungi, and appears as a minute organism of spherical form. It multiplies by fission—a single coccus forming two—these two producing four, and so on. They present a variety of appearances under the microscope, as you will observe in Fig. 1. From single isolated specimens (which under the highest magnifying

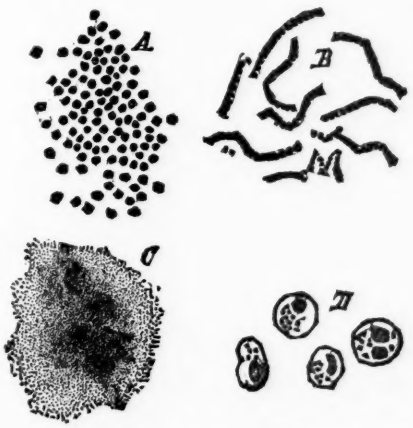

FIG. 1.—Sphero-bacteria (Micrococci). *A*, Micrococcus vaccinæ (× 1,000); *B*, same in chains (× 650); *C*, a zoöglœa mass; *D*, M. gonorrhœa (× 600.

powers present nothing beyond minute points), you will observe them in pairs, again in fours, or in clusters of hundreds—yes, thousands (forming zoöglœa), and still adhering together, forming chains.

When a given specimen is about to divide, it is seen to elongate slightly, then a constriction is formed, which deepens

until complete fission ensues. Micrococci possess no visible structure. They consist of a minute droplet of protoplasm (myco-protein), surrounded by a delicate cell-membrane; certain forms are embedded in a capsule. (Diameter, .0008 to. 001 millimetre.)

These little organisms, when observed in a fluid like blood, sputum, etc., are found to present very active movements, although provided with no organs of locomotion. This Brownian motion is possessed by almost every minute particle of matter, organic and inorganic, and is not due to any inherent power of the individual.

Micrococci are almost omnipresent. They are always found in millions where moist organic matter is undergoing decomposition. They are associated with the processes of fermentation, in fact, they are essential to it. The souring of milk succeeds the multiplication of these germs. They abound in the air, the earth, the water. Certain varieties are pigmented, and you will observe colonies of these *chromogenic* cocci multiplying in our laboratory upon slices of boiled potato, egg, etc., presenting all the colors of the rainbow. Fortunately, all of these germs are not associated with, or rather are not the cause of disease. Certain species, however (termed *pathogenic*), are always associated with certain diseased conditions.

The second plate which I present (Fig. 2), illustrates the microscopical appearance of the *Bacterium termo*, *micro-bacteria*. You observe that they are slightly elongated, and inasmuch as they multiply by division they frequently appear coupled together, linked in pairs, and in chains. They are generally found in putrifying liquids, especially infusions of vegetable matter. They possess mobility to a remarkable degree. Observing a field of the bacterium termo under the microscope they may be seen actively engaged in turning, twisting, or oscillating—a delicate tail-like filament, or *flagellum*, has been demonstrated as attached to one or both extremities. This is too minute to be generally resolved, even if it is a common appendage.

Micro-bacteria are of various kinds, and although many are pathogenic, the *bacterium septicæmiæ* of Koch produces the most

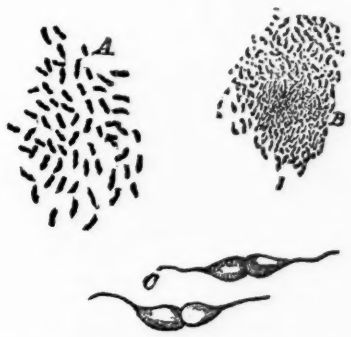

FIG. 2.—Micro-bacteria (Bacteria). *A*, Bacterium termo; *B*, same in zoöglœa mass (× 600); *C*, same (× 2,100) showing flagella.

rapidly fatal results when introduced into the circulation of a living being. Other examples of this class, resembling in every respect, as far as their microscopic features are concerned, the septicæmic bacterium, are frequently found in the blood of perfectly healthy persons.

Desmo-bacteria (or bacilli) are rod-like bacteria, occurring of various lengths and of different thickness. On this account authors have introduced the term *vibrio*, as applied to the long, slender, curved, and thread-like bacillus; bacilli are not infrequently provided with a flagellum, which assists in locomotion. The different species of bacilli differ greatly in their microscopic appearance; while some are rounded at their extremities, others are square cut, and others pointed. Bacilli may develop by division, but their usual mode of development is by spores. You will observe in Fig. 3 the bacillus of tuberculosis and anthrax. Notice at intervals the dots, which represent the spores from which, as the rods break up, future bacilli are developed.

Spiro-bacteria. In Fig. 4 I present to you drawings of two different forms of spiro-bacteria—the spirilla and the spirochetæ. The former have short, open spirals; the latter long and closely wound spirals. The *spirillum volutans* is often found in drinking-water and, in common with some other specimens of this class, is provided with flagella, sometimes at both extremities, which furnish the means of their rapid locomotion. The spiro-bacteria multiply by spores, although little is at present known of their

life-history. They not infrequently are attached together at their extremities, forming zigzag chains.

In this brief description of the principal varieties of bacteria (classified according to their form), we have seen that they differ

FIG. 3,—Desmo-bacteria (Bacilli). *A*, Bacillus tuberculosis (× 2,000); *B*, the same (× 350); *C*, Bacillus anthracis, from the blood in splenic fever (× 750); *D*, Bacillus lepræ, showing bacilli in cells isolated from tuberculous nodules by teasing (× 1,000).

greatly in appearance, from the minute dot of the micrococcus and the elongated dot of the bacterium proper, to the elongated rod or cylinder of the bacillus and the long spirals of spirobacteria. It is unfortunate that these minute forms of life are not sufficiently constant in habit to always attach themselves to one or the other of these genera. The micrococcus has a habit of elongating until it is impossible to recognize him except as a bacterium; while bacilli break up until their particles exactly resemble the micrococci. Again, there are other forms which cannot be classified with the above; but I will not at present burden you with the complicated forms of *fungi* which are found existing as moulds, yeast-plants, etc., but will pass to the consideration of the *biology of bacteria*.

Bacteria cannot exist without water. Certain forms require oxygen, while others again thrive equally well without it; some thrive in solutions of simple salts, while others fastidiously object to anything less than broths of albuminoid material.

The most important element in the successful multiplication and growth of fungi seems to be the maintenance of certain temperatures. The temperature of the human body is necessary

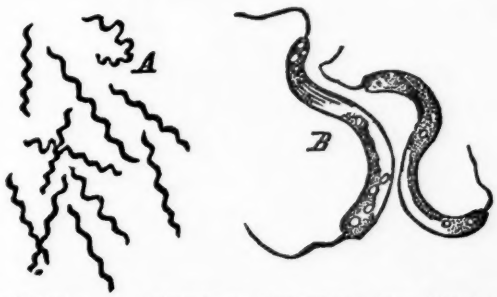

FIG. 4.—Sprio-bacteria. *A*, Spirochæta Obermeieri, from blood in recurrent fever (x 1,000); *B*, Spirillum undula, from bog-water, showing flagella (x 3,000). After Dallinger.

for certain pathogenic bacteria, while ordinary temperatures serve for many varieties. Still there are points above or below which all cease to live. Immersion in boiling water rapidly destroys most forms, while prolonged boiling is fatal to all. It appears that while many forms of fully developed germs are easily destroyed by a temperature much less than 212° F., their spores are capable of withstanding high temperature with less risk of injury. The peculiar behavior of each species under observation, must, as regards the effect of heat, be carefully determined, ascertaining the most favorable temperature for their development, and the degree of heat necessary for their destruction. If the conditions of temperature, media, etc., are observed carefully they will develop with extreme rapidity.

In the study of the relation of a given bacterium to a certain disease, it becomes necessary to attend carefully to three different operations.

First, the organism supposed to cause the disease must be found and isolated.

Second, it must be cultivated through several generations in order that absolute purity may be secured.

Lastly, the germ must be again introduced into a healthy living being.

If the preceding steps be successfully carried out, and the original disease be communicated by inoculation, and the germs

be again found in the diseased body—we have no alternative—we must conclude that we have ascertained the cause of the disease. The importance of being familiar with the etiology of disease before we can expect to combat it with any well-grounded hope of success is evident.

The three steps I have alluded to are surrounded with difficulties, and if you will follow me I will endeavor to indicate some of them.

Let us suppose, for example, that we wish to repeat the work of Koch with the bacillus of tubercle. Let me premise by saying that it is believed that certain little rod-like forms are invariably found associated with tubercle. If the sputum of a phthisical patient be submitted to the skilled microscopist he is always able to demonstrate the bacilli. This goes for very little. Because bacilli are found in phthisis it is no more certain that they are the cause of phthisis than is it certain that cheese-mites are the cause of cheese. But if with these bacilli we can inoculate a person, and thus produce tuberculosis, we have the chain complete.

Well, supposing we were to inject some sputum from a phthisical person into the blood of a healthy person, and then boldly announce to the world that you have demonstrated the relation of cause and effect between the bacilli and phthisis. You would start such an uproar of objection as would speedily convince you that there was much work yet for you in the domain of bacteriology.

Among these objections would appear this, and very properly too: "You have injected in the blood of your unfortunate patient pus, morphological elements, and, perhaps, half a dozen other forms of bacteria with the sputum, any one of which are just as likely to prodnce the lesion as the bacillus you have selected."

So you must begin again. You must first isolate your bacillus.

It is a fortunate fact in the biology of bacteria that nearly every specimen has a peculiar mode of growth. If I were to take a glass plate, one side of which is coated with a thick solution of hot, peptonized gelatine, and allow the latter to cool, the gelatinous matter will become solid. If, now, with a wire dipped in

some tuberculous matter, I draw a line along the gelatine, I have deposited at intervals along this line specimens of T. bacilli. If this plate be now kept at a proper temperature, after a few days, wherever the bacilli have been caught, a grayish spot will appear, which, easily seen with the naked eye, gradually spreads and becomes larger. These spots are colonies containing thousands of T. bacilli. It is not probable, however, that we have been fortunate enough to have avoided depositing other germs along the line. If putrefactive bacteria are present, they will liquefy the gelatine. Various appearances are thus afforded, even to the naked eye, according to the particular bacterium present, and we soon become familiar with the characteristics of particular germs. Cultures of bacteria are usually made in test-tubes containing peptonized gelatine, coagulated blood-serum, etc. Let us return to our gelatine-plate. We find a spot which answers the description of a colony of tubercle bacilli. We now take a minute particle from this colony on a wire and convey it to the surface of some hardened blood-serum in a test-tube. We plug the tube so that no air-germs may drop in, and place it in an incubator at the proper temperature. After several days, if no contamination be present, a colony of bacilli will appear around the spot where we sowed the spores. Let us repeat the process; take a particle from this colony and transfer to another tube; this is our second culture. This must be repeated until we are satisfied that we have secured a "pure culture." If this be carried to the twenty-fifth generation, we may be assured that there remains no pus, no *ptomains*, nothing but the desired bacilli. It is a proper material now for *inoculation*.

Practically, many precautions have to be thrown around every step of our work. You can see that spores might accidentally be attached to our tubes. They must be *sterilized*. This is accomplished by exposing them to prolonged high temperature in an oven. Similar precautions are taken with the plug of cotton used to stop the mouth of the tube. The wire must be heated to redness always just before using. We are in constant danger of contamination, and sometimes fail even with the utmost care. Fortunately, we can determine whether everything is as it should

be. If a tube shows signs of admixture, it is discarded at once and another trial made.

Negeli has proposed a "dilution method" for obtaining "pure cultures." He had some urine containing large *micrococci* which he wished to cultivate. The urine also contained numerous *bacilli*. A single drop of the urine, supposed to contain five hundred thousand bacteria, was mixed with about two ounces of pure water and shaken thoroughly. This dilutes the urine a thousand times. One drop of this is now mixed with another two ounces of water, and a millionth dilution was obtained, in which every drop must average to contain one bacterium. He inoculated ten tubes of gelatine each with one drop of this dilution. After incubation it appeared that four tubes remained sterile, one contained bacilli, and five the *desired cocci*.

You will find in our biological laboratory the modern appliances for sterilizing the fluids, vessels, etc., as well as several incubating ovens, the temperature of which may be maintained at a given point for months. The large incubator constructed by Dr. Miller will accommodate several thousand culture-tubes at once.

We have, then, finished the second step in our work, that is, we have obtained our bacilli pure, and have cultivated them through several generations, and it is improbable that our culture-tubes contain any contamination from the original source of our supply of bacteria.

It remains for us to complete the work, that is, we must now reproduce the disease by inoculation with our pure culture. Now we are forced to resort to the lower animals for experiment. No one, as yet, has sufficient admiration for science to inoculate himself. Hence it is impossible to complete a perfect chain of evidence. Objection can be reasonably made to the employment of mice and guinea-pigs. It is just possible that deductions from such experiments would not hold with human beings. But there seems to be no alternative. We proceed to inoculate several guinea-pigs with our pure culture of tubercle bacilli. The following are the results as first obtained by Koch, and which are almost identical with the phenomena obtained in our own work. The

utmost care having been taken to avoid contamination of our virus (by heating the inoculating needle red-hot just before using), a puncture is made through the skin and a few drops of pure culture injected into the loose areolar tissue of the neck.

"The wound generally closes on the second day. The inguinal and axillary lymphatics become swollen on the eighth day. From this time the animals lose weight rapidly, and die in four or five weeks from the time of inoculation. In the spleen and liver the characteristic tubercular changes are found." Koch's results led him to believe that "the bacilli occurring in tuberculous substances were not merely the attendants of tuberculous processes but the cause of them, and that *the bacilli actually represented the true tubercle-virus.*"

I have spoken thus of the tubercle-bacilli in order to give you a general notion of the processes employed, and the precautions necessary in this work. The steps are nearly the same with the bacteria found in other diseases. The same extraordinary precautions are always necessary to avoid contamination. Some thrive in one fluid, some in other, some at ordinary temperatures, some at the body-heat.

From my remarks thus far you may have inferred that it is a very easy matter to find the bacterium of any particular disease, but I must correct this error. Let us place a particle from the discharges of a cholera patient under the microscope. Among the objects filling the field are numerous little curved rods—the comma bacilli. But if you now substitute a drop of fresh normal saliva for the choleraic discharge, you will find little curved rods in every respect like the commas of cholera. I may as well say at once that the microscope alone will not enable us to determine whether a given bacterium is pathogenic or not. You have already seen that each species possess peculiarities of growth in our culture tubes.

Bacteria also frequently afford peculiar chemical reactions. For example, nitric acid will discharge the color from all bacilli, artificially dyed with anilin, *except those of tubercle and anthrax.* One species is stained readily with one dye, that leaves another unaltered. Thus we are enabled in the laboratory to determine

whether the bacilli found in sputum, for example, are from tubercle or are the bacteria of decomposition.

From what I have said of the tubercle bacillus it would seem as thoroughly demonstrated that it was the cause of tubercle in these animals. But we must walk cautiously here. These are not human beings; who knows that like results would follow their inoculation? The animals used by Koch are animals very subject to tubercle.

We must, from the very nature of our environment, be constantly inhaling these germs as we pass through the wards of our hospitals—yes, they are floating in the air of our streets and dwellings. It becomes necessary for us to inquire, If bacteria cause disease, in *what manner do they produce it?* Ziegler says: "The healthy organism is always beset with a multitude of non-pathogenous bacteria. They occupy the natural cavities, especially the alimentary canal. They feed on the substances lying in their neighborhood, whether brought into the body, or secreted by the tissues. In so doing they set up chemical changes in these substances. While the organs are acting normally these fungi work no mischief. The products of decomposition thus set up are harmless, or are conveyed out of the body before they begin to be active." If bacteria develop to an inordinate extent, if the contents of organs are not frequently discharged, fermentation processes may be set up, which result in disease. Bacteria must alway multiply and exist at the expense of the body which they infest, and the more weakened the vital forces become the more favorable is the soil for their development.

Septicæmia is caused by the absorption of the products of putrefaction induced by bacteria. Before bacteria can multiply inside or outside the body they must find a congenial soil. The so-called cholera bacillus must gain access to the intestinal tract before it finds conditions suitable to colonization. They do not seem to multiply in the stomach or in the blood, but once injected into the duodenum they develop with astonishing rapidity. The delicate epithelial cells of the villi become swollen, soften, and break down, exposing the mucosa

But it becomes us to proceed in this matter with great cau-

tion. We must avail ourselves of every means of research, and patiently endeavor to ascertain what of pure gold there is in this new field of study. The subject is a fascinating one, and it seems to settle, or at least, open the way of settling, so many hitherto difficult questions in pathology, that it has been accepted by many without such a basis of facts as every careful investigator should demand. Another very extensive and important field opened by bacteriology is that of the prevention of disease by inoculation of attenuated or modified bacterial matter.

Pasteur, experimenting with the bacilli of anthrax, found by exposing the microbes to a certain temperature higher than that most favorable for their development, they lost their virulence to such an extent that he could vaccinate sheep without danger; and that animals so vaccinated were, for a given time, rendered incapable of contracting anthrax. Various opinions are held regarding the value of these experiments at present. You are all familiar with the newspaper accounts, at least, of Dr. Ferrán's experiments with the cholera inoculation. We are not at the present time able to speak with any degree of positiveness regarding the value of this work.

What is to be the future of the very interesting and fascinating studies to which I have this afternoon briefly directed your attention, no one as yet can determine. It is in the hands of ardent students, who are everywhere carrying out new investigations, and I shall not burden you with my own opinions in regard to it. The great question at present to be settled is, whether we are about discovering the ultimate cause of many hitherto obscure pathological states, or whether these microbes are only bacteria of health taking advantage of diminished vitality to develop with increased rapidity—*whether they are the cause or the scavengers of disease.*

VACCINATION FOR CATTLE-PLAGUE.—The success of Pasteur's method of vaccination for the cattle-plague in India is said to have been brilliant. It was used for elephants, cattle, horses and sheep.

EXPERIMENTAL PATHOLOGY.

OF ALTERATIONS IN THE PULMONARY STRUCTURE OF DOGS BY THE INHALATION OF THE SPUTA OF PHTHISIC PATIENTS, AND OF OTHER ORGANIC SUBSTANCES.

By W. Wargunin.

Although the idea of comparing the pulmonary lesions produced by the inhalation of the sputa of phthisic patients, and of other organic substances, originated with Prof. Manassein, it was in the laboratory of Prof. Rajewski that the researches were prosecuted.

The method by which the author aimed to secure the desired results was the exposure of a dog to the constant inhalation of an infected vapor, the animal being placed in a box properly constructed to insure thorough passage of the vapor employed in the experiments. This vapor was charged with a liquid containing, in a pulverulent form, the sputa of phthisis taken from emphysematous patients, mixed with cheese and flour, and the dog was thus confined to an atmosphere fully charged with solid particles of infected matter. In some cases the sputa had been disinfected with phenic acid. The liquids that were to be pulverized were of a milky consistency. Between the experiments, the dogs were placed in cages exposed to free air.

In a first series of experiments, the pulverized liquids contained the sputa of phthisis, diluted and filtered through linen to remove the coarser particles.

The entire eleven dogs submitted to these tests presented pulmonary lesions.

In a second series, the liquid contained sputa, which the author had tried to sterilize by the addition of two parts of phenic acid to 100 of the filtered liquid, and by boiling it three times at intervals of two or three minutes. Similar lesions were again obtained.

In a third series, the pulverized liquid, containing either sputa of emphysematous patients, cheese or flour, furnished the same results. The author concludes that these lesions were not the result of a specific element.

Wargunin made the histological examination of the lung matter of these lesions, in order to study their nature.

He first reports a case shown to him by Rajewski, referring to the pulmonary substance of a cat, in which, to the naked eye, it seemed like that of miliary tuberculosis, and resembled pneumonic nodules.

The lesion observed in a dog had also the form of nodules, constituted by groups of unfiltered alveolæ, having a little bronchia in the centre. In most cases the cellular wall of this bronchia was thickened. No giant cells could be anywhere detected. With a 300-diameter magnifying power, these nodules appeared to be formed of young cells, fusiform in appearance, and these being destroyed, the walls of the lobular bronchia penetrated into their cavity and obliterated them. These masses of young cells contained no blood-vessels, and underwent fatty degeneration. The alveolæ next to the obliterated bronchia were often atelectasiated. The alveolæ showed the same masses of new cells, with destruction of the walls, and the same fatty degeneration, but no caseous changes. The lesion seemed to start from the bronchial walls and to extend on one side to the bronchial cavity, and on the other to the alveolæ. The author does not, then, consider these lesions to be tuberculous, but to be those of lobular-bronchopneumonia. He had begun his researches before the discovery of the bacillus of Koch, and now asks if this micro-organism possesses the etiological value attached to it, and if tuberculosis is truly a contagious and parasitic disease.—(*Revue de Sciences Medicales.*)

UPON THE TUBERCULOSIS OF THE UDDER OF THE COW, AND TUBERCULOUS MILK.

By B. Bang.

Professor Bang, of the Veterinary School of Copenhagen, has examined twenty-seven tuberculous udders of cows. Tuberculosis in the cow often affects that organ, and often begins there; in all the cases the milk contained tuberculous bacilli, and frequently in great quantities. Inoculations made by him always gave positive results; in some animals very rapidly. Feeding

with the milk produced tuberculosis in all the animals that partook of it. Contrary to the opinion of Koch, he believes that the milk of a phthisical cow may contain tuberculous bacilli; even when the udder is sound.—(*Ibid.*)

TUBERCULOSIS AND GLANDERS.

By Mr. Cherrin.

A series of experiments was instituted to decide whether, as differing from syphilis, tuberculosis and glanders can be inoculated to an individual already tuberculous and glandered. The results showed that ten guinea pigs, of which three were evidently tuberculous, with both local and general symptoms, were again successfully inoculated with tuberculosis. Two others presented ulcerations at the seat of the second inoculation, the ulcers having the microscopical aspect of tuberculous ulcerations, but containing no bacilli. (These are not counted in the statistical report of the experiments.) Three guinea pigs, with lesions of glanders, were also re-inoculated with the virus of the same disease, and in all three, a second chancre made its appearance at the point of the second puncture.

The conclusion is adopted that these two diseases are re-inoculable in individuals previously affected.—(*Ibid.*)

AMERICAN VETERINARY COLLEGE.

HOSPITAL DEPARTMENT.

Report of Cases by J. Scheibler, D.V.S., House Surgeon.

POTT'S DISEASE—CARIES OF THE CERVICAL VERTEBRÆ.

On the 26th of August Dr. Liautard was called to visit a patient, and received the following history: On the morning following a day's work, some two weeks previous, the horse was found stiff all over, and unable either to back out of his stall or to move forward. The owner had supposed him to be foundered, as he termed it, and had placed him under treatment of his own devising, consisting in a severe mustard plaster upon the whole

inferior surface of the neck, under the chest, on both sides of the thorax, and over the lumbar region. The condition of the animal during this treatment continued unchanged. He was unable to move, except with great difficulty, or to lower his head to drink from a pail of water, or to pick up food placed on the ground, but otherwise his health appeared to be perfect. When Dr. L. visited the horse, he found him with a thick swelling all along the lower border of the neck, extending down between the fore-legs and under the chest; and the parts which had been covered with mustard, covered with a thick crust, more or less dry, which were falling off in spots. Failing to detect any other symptoms, and attributing all the symptoms to the peculiar condition of the blistered parts, simple treatment for the removal of the scabs was directed, with advice to report again in a short time. Early in October, the animal being reported to be no better, it was decided to have him brought to the hospital, and he was entered on the 9th instant, having walked down from the place, a distance of about fourteen miles.

When admitted, the horse was in fair condition, and every function was normal, except that of locomotion. His head and neck were held in an upright position, the inferior border forming a convex line forward, and presenting a good example of the peculiar formation called "*deer neck.*" On the upper cervical region the muscles were much atrophied, principally on the left side, and at about the middle of the region it seemed as if there had been a giving way of some soft structure. The head could not be carried downwards, and the lateral motion, either to the left or to the right, was very limited and very painful. All his movements were awkward, and when called upon to walk, he obeyed with great difficulty, and at times as if he had lost partial control of his actions. In walking, he moved much like an animal suffering from laminitis.

The animal was evidently in a critical condition, and while a positive diagnosis was reserved, the state of the superior cervical region suggested the possibility of degeneration of some kind, either in the muscles or in the ligamentum nuchæ, or possibly of disease of the vertebræ.

While under observation, nothing was specially observed beyond

the difficulty of lowering the head, and that, when food, solid and liquid, was placed before him on the floor, he was unable to pick it up, and pawed actively with his fore feet, until the food or the water was brought within his reach. It was also noticed that his control of his movements seemed to diminish day by day, and his actions to become more difficult and irregular.

On the morning of the 18th he was found lying down, on the left side, unable to rise, and when raised with slings, to be unable to stand. Permission to destroy him was then obtained from the owner, and a post-mortem was held.

The skin upon the right side being carefully removed, the muscles were dissected, layer by layer, until the vertebræ and ligamentum nuchæ were reached, but nothing was found worthy of note, except that the cellular tissue between the muscles was more or less infiltrated with serosity. The body was then turned over, and the same course followed as on the right side. On this side the muscular structure had undergone a thorough change, and had become a jelly-like mass, from the infiltration of serum throughout, with a softening of the muscular fibres.

The cranial cavity was then opened, and the brain removed. The left hemisphere was somewhat softened and congested; the right hemisphere being also slightly congested on the anterior part. The bones of the cervical region being boiled and cleaned, the fourth and fifth cervical vertebræ were found diseased, and presenting the following characteristics: In the fourth, which was unusually large, the articular cavity of the body was extensively ulcerated for more than two-thirds of its extent, and not only was the cartilage destroyed, but the bottom of the cavity was irregular and exposed the spongy substance of the body of the bone. In the fifth, the head of the body was irregularly roughened, and the cartilaginous covering all destroyed, and even a large amount of the spongy substance had disappeared to such an extent that the articular part of the bone had become transformed into a rough and irregular surface. The inferior face of the bodies of both vertebræ, the superior face, which forms the floor of vertebræl canal, and the cavities of the trachelian foramen of the fifth vertebræ was covered with calcareous deposits, resulting from the extensive periostitis which covered the bones.

NAVICULAR DISEASE, OF LONG STANDING, IN A HIND FOOT—SOFTENING OF THE PERFORANS TENDON—BREAKING DOWN—DEATH.

By the Same.

A bay gelding, of seven years old, was found to be lame at the first visit of the groom, and Dr. L. was called to see him.

The animal was standing in his stall, very lame in the off hind leg, with lancinating pains, and was with difficulty backed out. The shoe was taken off and the foot carefully examined, but without detecting anything about that region to account for the severe lameness. The appetite was poor, the temperature 102°, and pulse about 50, and respiration increased. The visible mucous membranes were slightly yellowish, and it seemed that some heat and swelling could be detected at the hock and at the hip joint. A diagnosis of inflammatory rheumatism was made, and the patient was placed under salycilic acid, ʒ ij. *ter. in die*, with warm fomentations, etc. Close examination failed to discern either improvement or change, until the third day, when a few drops of suppuration were observed between the glomes of the frog, almost in the middle, and directly over the posterior commissure of the middle lacunæ of the frog. A small collection had taken place under the frog; it was the result either of a bruise, on a punctured wound, or of a furuncle of that part. The lameness remained the same, and the general condition was without change.

The animal was then brought to the hospital. The frog of the foot was removed, and a small punctured wound, such as might be made with a small wire, was found, and scarcely sufficient to explain the excessive lameness and the great suffering.

For two successive days there was no change, but the same lameness and pain; the temperature and pulse continuing high, though the appetite continued pretty fair. On the 16th, the sixth day of the attack, no suppuration was found in the foot, but a few drops of synovial fluid appeared. The posterior part of the coronet was slightly swollen, and, on examination, gave a feeling

ture, or deep gathering of pus. Iodine, externally, with cold water and bandages, were applied on this, while antiseptic dressings were applied to the foot, and alcoholic stimulants and tinc. opii were given to keep him quiet.

On the 17th of October, the animal was attacked with violent colicky pains and nervous twitchings; his body became covered with profuse perspiration; and at one time he seemed to be delirious with pain. He was quieted with tinc. opii and chloral.

The foot was all healed, and on the 18th of October, following day, a ball of aloes was given to relieve the constipation.

On the 21st, the animal seemed more comfortable. The violent lancinating pains had somewhat subsided, and there seemed to be an improvement in his general condition. There was a lower temperature, with a better pulse and appetite. A blister which had been rubbed on the back of the coronet seemed to have relieved him, and the scabs were washed off.

Oct. 27th.—The animal appeared to rest his foot comfortably on the ground, with perhaps a slight tendency to elevation of the toe.

Oct. 28th.—A splint of leather sole was applied as a support on the lower part of the limb, and kept up with a linen bandage.

Oct. 30th.—The removal of the dressings leaves no more doubt as to the lesions which have existed. The foot in resting down, does it principally with the heel, while the toe is turned upwards. An abscess has formed and ulcerated on the outside of the posterior part of the coronet. It is a true case of breaking down.

The animal was destroyed.

On post-mortem examination, the frog was found perfectly healthy. There were strong adhesions of the plantar aponeurosis over the entire surface of the posterior face of the navicular bone, which was extensively ulcerated and covered with caries in its whole extent. It was roughened, and its fibro-cartilaginous coverings had entirely disappeared. The tendon of the flexor pedis perforans was ruptured a little above its attachment to the navicular bone. The stump of the tendon had become a softened, degenerated mass, about half an inch in length, and

of puffiness, which suggested a softening of ligamentous struc- showed on the side, where it was continuous with the tendon, an irregular red line of demarcation, with the beginning of a slough- ing in the neurotic tendon. The articular surface of the os corona, corresponding to the os sesamoid, presented an ulcerated spot of the size of the head of a shawl pin.

RACHITIC HORSE—OPERATIONS FOR SQUIRROUS CORD—FRACTURE OF DORSAL VERTEBRÆ.

By the Same.

The history of this case is interesting on account of the extent of the lesions that were found at the post-mortem, and which tend to corroborate the theory that in many cases of fracture of the vertebræ, during the struggles of an operation, the accident is due principally to a predisposition in the patient, resulting from an already existing diseased condition of their bones.

A gray gelding, some 11 years old, was suffering with a small champignon of the left side, which, however, had never interfered with his work, though it had made the horse unpleasant to his owner during the warm weather, on account of the discharge and of the odor resulting from it. For this reason the owner desired to have an operation performed, notwithstanding its various attendant dangers, of which he was thoroughly informed. The animal was accordingly prepared, on the morning of the 5th of November, receiving a seven drachms ball of chloral, and about two hours later was cast on the right side. The near leg was secured, and the operation performed in the usual manner, without any very violent struggling on the part of the animal. The operation having been completed, and the hobbles removed, he rose to his feet, after some little interval of time, but without apparent difficulty, walked to his stall some thirty feet off, and proceeded to eat his breakfast. He had not been thus engaged more than ten minutes when he began to betray uneasiness, com-

mencing to paw, to kick with his hind feet, and to throw his head from side to side, and as he was being carefully backed out of his stall, to be placed into a box stall, he fell down and passed into a deep sleep. After remaining thus about half an hour, he seemed to waken, and his circulation, which had fallen to 30 pulsations, began to rise, his respiration also becoming more accelerated, a rather abundant respiration showing itself at the flanks and in the scrotal region.

After making a few ineffectual attempts to rise, he at length, with some assistance, succeeded in gaining his feet. He was then led to the box stall, when he fell again; rose again; entered the stall; moved about in it a few moments, and once again fell prostrate, to stand on his feet no more.

From this moment to the end of the second day, the animal never made another attempt to rise, but laid quietly, on his right side, and it was only toward the middle of this second day that he made any manifestation of pain, by the constant motion of the two fore legs.

The diagnosis could not be doubtful. The animal was suffering from fracture of the vertebræl column, received during the operation, notwithstanding his partial anæsthesia and the mildness of the struggles he had made while under the knife. He had lived thirty-six hours after the accident.

On the post-mortem, the lumbar vertebræ were found to be the seat of the injuries. The body of the fourth was crushed into several pieces; the fifth and sixth were anchylosed and exhibited a large bony growth at their inferior face, the same lesion existing also between the sixth and the first sacral. Besides these, the superior spinous process of the last three lumbar, and those of the first two sacral, were fractured across their middle. These bones, when boiled and cleaned, in order to expose the broken fragments, were found in that dry condition to be so brittle as to be easily broken by the least pressure of the hand. The sacrum, as well as the other vertebræ, had also undergone the rachitic degeneration, which undoubtedly had predisposed them to be so easily fractured.

REPORTS OF CASES.

CASES FROM A NOTE BOOK. BY C. C. McLEAN, V.S., (Meadville, Pa.)

HYDROCHLORATE OF COCAINE FOR NEUROTOMY.

I performed neurotomy on a valuable pacing gelding, August 17th, for navicular arthritis, the case having failed to yield to any of the usual methods of treatment. I cast in the ordinary manner and used half a drachm of four per cent. solution cocaine hypodermically over the tract of the nerve, on each side of limb, at point of section, and removed over an inch of nerve. No manifestation of pain shown during entire operation, except slight movement when cutaneous incisions were made. Above case was the second opportunity I have had of testing cocaine in neurotomy, making a short and painless operation with no evil results.

CÆSAREAN SECTION IN THE SOW.

A sow had been in labor twenty-four hours, and farm hands had tried all manner of means to effect delivery, and in so doing had lacerated and excoriated the vulva and vaginal passage to such an extent that it would have been a difficult matter to have delivered her had everything been natural. On close examination, I found an osseous growth of ischio-pubic symphysis to be the cause of the dystokia, and from the efforts made before I was called, both hind legs and one fore one had been pulled off a pig. I lost no time, after my examination, in securing the sow, and made an incision in right flank, from near point of ilium downward far enough to enable me after incising the uterus, to remove five large living pigs and the mutilated dead one and envelopes. After cleansing uterus thoroughly, I closed the opening in same with eleven carbolized gut sutures, and the abdominal incision with nine wire and gut sutures. I feared an unfavorable termination on account of severe inflammatory action caused by the previous unsuccessful attempt of the neighbors. The operation was performed a portion of the time under antiseptic spray

and a stimulating and anodyne draught prescribed afterward. Next day, on calling to see my patient, words cannot describe my surprise to find her ladyship and four of the pigs, one having died the previous night, in a mud hole in the pig yard. Her owner stated that she felt so well he thought she was better out in the yard, and she never missed a meal after that time. An antiseptic wash was used in vagina, and she will be operated on next time by the butcher.

POST PARTUM PARALYSIS FOLLOWING DIFFICULT DELIVERY.

A two-year-old Holstein heifer at term had labored seven hours when I first saw her. Water had escaped during first pains. Examination revealed large fœtus, but presentation normal; passage devoid of moisture. After the introduction of a quantity of lard and repeated injections of oleum olivæ and proper traction by two able assistants, delivery was accomplished; heifer recumberent at time. A reviving drench was administered. Heifer properly clothed and left for the night, during which the placentæ was cast. Next morning found her unable to rise. On the approach of a dog she made desperate efforts, but had no control of either fore or hind limbs. Moaned continually. Examination of uterus revealed nothing; ordered hand rubbing and gave laxative, and used catheter, as urine was retained; gave enemas and hypodermics of strych sulph. gr. i., and turned her over every two hours. On third day she is able to stand with some assistance, but stands behind, with feet back, weight resting on metatarso phalangeal articulation. When forced to move, staggers about and joints snap and crack, but improving rapidly. On fifth day she shows no signs of having been sick.

SECOND CASE.—A two-year-old Holstein, at term; stable attendant visits her at 10:30 P. M. Udder not full, nor any evidence to lead him to think she would give birth that night. At five o'clock next morning she is found in her box with dead male fœtus behind her, not large, but there is well marked evidence in stall that she has labored hard. Placentæ still retained; heifer unable to rise; symptoms same as first case. Placentæ removed, and treatment same.

3d day. Heifer is up and has done well. I mention these two cases as both occurring on one farm the same day; caused undoubtedly from protracted labor. Furthermore, such cases are not common among heifers. Both owned on a breeding farm and well cared for and well nourished.

GENERAL MELANÆMIA IN A VALUABLE STALLION.

By A. D. Galbraith, D.V.S., (Greensburg, Ind.)

I was called October 23, 1885, by Mr. Buck Dickerson, horseman of this city, to see his noted trotting stallion Pilot Duroe, sire of a large number of flyers in this part of the country.

The horse was a light iron gray, medium size, and twenty-one years old. He served mares in Kentucky the last season, was brought back home in the summer, and at the time the owner refused $2,500 for him.

The history of the case is: about three weeks before I was called the horse seemed to be out of condition. Mr. Dickerson thought the trouble but slight and would pass off, but he gradually grew worse and on the 23d of October Mr. Dickerson became alarmed and sent for me. I found the horse stupid, breathing laboriously, and it caused him considerable pain to move; his pulse was about 80, temperature 105°; abdomen considerably distended, and œdematous swelling on the belly and sheath.

Rectal examination revealed: First, an abnormal growth in the superior pelvic region above the rectum, from one to two inches thick, from two to three inches broad, and about eighteen inches in length. Second, in the posterior part of the abdominal cavity, the hand came in contact with a tumor as large as a man's head, which seemed to be attached to the sub-lumbar region, and other smaller growths could be reached; all seemed to be very sensitive, and the examination was very painful to the horse.

The distention of the abdomen proved to be caused by fluid. Diagnosis—Ascites, caused from melanotic growths in the abdominal cavity. Prognosis—fatal.

As the case was an important one, I telegraphed my friend,

Dr. O. W. Snyder, of Rushville, twenty miles north of me, who arrived, and upon examining the case confirmed the above.

As the owner wanted the faithful old stallion kept alive as long as possible, I put him under digitalis, alcohol and nutritious diet, also laxatives, using astringent applications to the enlargements on belly and sheath. The horse improved. On the 24th, pulse 60; temperature 103°; on the 25th, pulse 50; temperature 101°; on the 26th, pulse about normal; temperature normal. The distention of the abdomen seemed to be lessening until about the 2d or 3d of November, when he began to rapidly fill again, and on the 4th I performed paracentesis-abdominis and allowed twenty gallons, actual measure, of fluid to escape, about, three-fourths of all, which relieved him considerably at the time. The fluid was about the color of highly colored urine. The horse did well, considering that, up to the 12th, when he filled and weakened rapidly and was bloated over the lower part of the body and extremities. His appetite was reasonably good up to the 14th, after which he ate no more. On Sunday morning, the 15th, he expired. I did not get to hold a post-mortem until Monday morning, when he was enormously swollen and smelled very badly. I laid open the entire abdominal and thoracic cavities. The abdominal cavity contained not less than twenty gallons of dark brown fluid. The peritoneum mesentery was a complete mass of melanotic deposit, from one to two inches thick. The kidneys were covered with the growth and a great many deposits through them, they both containing from one to two ounces of dark yellow pus. The spleen was enlarged and contained a mass of melanotic growths. The liver was also covered and contained melanotic deposits.

The large tumor found before death was as large as a man's head and weighed twelve pounds and was attached to the sub-lumbar region. The first growth found was as previously described. There were not less than fifty pounds of melanotic growths in the abdominal cavity. The thoracic cavity was normal, so far as could be made out. The cadaver was in a very bad condition, from laying too long, and it was impossible to make a minute post-mortem.

SANITARY LEGISLATION.

CONTAGIOUS DISEASES AMONG CATTLE.

Report of the Veterinary Committee to the National Cattle Growers' Association.

To the Convention of the National Cattle Growers' Association.

Mr. President and Gentlemen:—We have the honor to submit the following report, adopted by the veterinarians and sanitary boards from the different States and Territories, at a convention held by them in Chicago, November 16 and 17, 1885, to wit:

There exists throughout the United States a large number of contagious diseases affecting our domestic animals, which are most harmful to the agricultural and stock raising industry, which entails great losses on the producers of the domestic animals, and some of these diseases can be communicated to man, causing severe illness and death. These contagious diseases are communicated from the diseased to healthy animals, by contact of the animals or by placing the sound animals in localities previously occupied by the diseased ones. Most of these contagious diseases have been imported into the United States from foreign countries, and are to a great extent still confined to limited localities, the majority of them in the Eastern States. Other of these contagious diseases are indigenous to the American continent, but are confined as yet to limited localities. All of these contagious diseases are spreading with variable rapidity, and are surely increasing. The violence and contagiousness of these diseases are variable, some being excessively dangerous, some only moderately so, some affecting several species of animals, some confined to a single species. Of these contagious diseases, pleuro-pneumonia in cattle, hog cholera, Texas fever, tuberculosis, and glanders in horses, are prevalent throughout a large portion of the United States, and are on the increase, destroying thousands of animals each year, and are injuring our commerce, both inter-State and foreign, to the extent of millions annually. These contagious diseases are propagated only by submitting sound

animals to contact with diseased ones, or with objects with which the latter have been in contact. The majority of these diseases cannot be cured when they have attacked an animal, but the occurrence of the majority of them can be prevented by proper precautions, which consist in preventing the communication of the sound animals, with objects bearing the contagion. In view of the immense wealth of the United States, especially in the West, centered in the industry of raising and exporting animals; in view of the increase of contagious diseases, which is surely bringing a scourge on this country, and in view of the present inharmonious and inadequate legislation in regard to these diseases, it behooves us to urge the necessity for immediate, prompt and forcible action to suppress the existing causes of disease, and to prevent their future spread. State laws are excellent, but insufficient, as they are unable to control the approach of disease from neighboring States which are less wise; neither can they prevent animals from a State which has maintained their soundness by constant care, from exposure to infection while passing through other States to distant markets, nor can they prevent the passage of diseased animals across the State to other States and Territories. It is necessary that we should have uniform and general laws, rigidly enforced, which will protect all alike. This can only be done through the general government of the United States, and while costly, will prove the most economical in the end. While we desire laws of sanitary police, which will protect us against all the contagious diseases of our domestic animals, we urgently appeal to the general and State governments for the appointment of a sufficient number of competent agents with the funds necessary for the immediate suppression of contagious pleuro-pneumonia in cattle, glanders in horses, hog cholera, and the restriction of Texas fever to the localities where it is indigenous.

Until we have other means at our disposal for the prevention of these diseases, we have but two lines of action to adopt—the absolute extermination of all animals which are affected with the disease, or have been so exposed that they may convey it to others at a longer or shorter peroid; the absolute interdiction of

all commerce in the domestic animals from localities which contain affected animals, or from which the source of contagion can be conveyed. The details of procedure for these cases will be the result of mature deliberation, requiring more time than we have at our disposal here, but the facts are indisputable. Other countries to their cost have procrastinated as we are now doing, and have paid for it in immense losses, and the ruin of their cattle trade.

Respectfully submitted,

J. D. HOPKINS, D.V.S., Wyoming Veterinarian.
PROF. C. B. MICHENER, D.V.S., Am. Vet. College, N.Y.
L. MCLEAN, M.R.C.V.S., Brooklyn, N. Y.
D. E. SALMON, Chief Bureau of Animal Industry.
J. L. BRUSH, Pres. Sanitary Board of Colorado.
PROF. R. S. HUIDEKOPER, Pres. (Member Ex. Officio.)

REVIEWS AND NOTICES.

WIRCHOW'S POST MORTEM EXAMINATION. A new, revised and enlarged edition. (P. Blackiston, Son & Co., Philadelphia, Pa.)

Here is an excellent little work, which, though prepared principally for human practitioners, will prove most interesting and valuable to veterinarians as well. The difficulties often present in the post mortem examinations of our domestic animals, and especially of the large ones, such as horses and cattle, would be greatly diminished if veterinary surgeons who conduct them would adopt certain rules and methods of procedure. But so long as the subject of post mortem investigation is ignored in the majority of our veterinary colleges, and perhaps for good reasons, we feel sure that veterinarians cannot find a better way to educate themselves in that speciality than by the careful study of Wirchow's post mortem rules.

L. & B.'s PHYSICIAN'S VISITING LIST for 1886. (P. Blackiston, Son & Co., Philadelphia, Pa.)

This, the thirty-fifth edition of this publication, is provided with many points of advantage and use to veterinarians. Why

not make a Veterinarian Visiting List? Few alterations in the list at present in use would, no doubt, make it a book which would be greatly in demand.

NOUVEAU DICTIONNAIRE PRATIQUE DE MEDECINE, DE CHIRRUGIE, AND D'HYGIENE VETERINAIRES. By H. Bouley, &c. Tome 13.

This is the thirteenth volume of an excellent encyclopædia, started many years ago, and containing the work of authors who have become the leading authorities in France in veterinary medicine. The present volume contains articles from the pens of Prof. Barrier, Bouley, Laulaine, Neumann, Nocard, Railliet, Sanson and Trasbot. Amongst the various subjects treated is that of glanders, by Prof. Bouley, in an article of over one hundred pages. This forms a most excellent treatise on the subject, bringing forward our knowledge from the very earliest history of the malady to our own day, and introducing the most recent of the theories of the pathology of the disease.

This excellent volume completes one more important page in veterinary literature, and adds a fresh laurel to the chaplet already well earned by the successful labors of the author, to whom the veterinary profession of the world owes so much.

CORRESPONDENCE.

VETERINARIAN WANTED.

Dear Editor:

Having given up my practice in Norwich, Conn., I would like to ascertain through the Review if there is not some graduate who would like to settle in the above mentioned city. It has a population of twenty-two or three thousand inhabitants, and is surrounded with towns of between six and twelve thousand more. There are no regular veterinarians within sixty miles. Any one wishing for further particulars can have them by directing to

W. D. Critcherson.

SOCIETY MEETINGS.

INDIANA VETERINARY ASSOCIATION.

The Veterinary Association of Indiana met in convention in their rooms in Menachor Hall, in Indianapolis, on the 16th inst., pursuant to adjournment, for the purpose of electing officers and transacting other important business. The following members answered to the roll-call: Drs. John N. Navin, Sr., E. H. Pritchard, A. W. Phillips, L. A. Grisner, Sr., T. L. Armstrong, J. N. Navin, Jr., Robt. M. Navin, John Colville, John C. Stuart, Wm. Langtry, W. R. McLane, Geo. A. Lowery.

The ballot for officers resulted in the election of Dr. J. N. Navin, Sr., President; Dr. J. Colville, 1st Vice-President; Dr. T. L. Armstrong, 2d Vice-President; Dr. L. A. Grisner, Sr., 3d Vice-President; Dr. W. R. McLane, Corresponding and Recording Secretary; Dr. A. W. Phillips, Treasurer; Drs. John N. Navin, Jr., G. A. Lowery and J. C. Stuart, Board of Censors.

THE ILLINOIS VETERINARY ASSOCIATION.

The Illinois Veterinary Association met at the Sherman House, Chicago, Nov. 12. Dr. Paaren introduced the subject of dishorning cattle. Mr. H. H. Haaf, a prominent farmer of Henry Co., Ill., advocated the practice. He had been led to experiment in this direction by hearing and knowing of so many cases of injury to persons by vicious cattle. He saws off the horns about an inch from the brain. No blood is lost and the animal suffers no pain. He thinks public opinion favors the practice.

Several members reported treatment of specific cases of disease.

A motion to amend the constitution, deferred from the last meeting, was brought up for consideration. It recommended the restriction of membership in the Association to graduates of recognized veterinary colleges. Dr. Paaren said he had found the diagnosis of diseases made by some men who enjoyed common sense and experience, but no thorough knowledge of anatomy or medicine, was often very imperfect. Their prescriptions in nine cases out of ten were evidences of their ignorance of chemistry. It is an injustice to qualified practitioners to admit such to membership and equality, merely on the ground of experience. The question was discussed by several members, who, with Dr. Wilson, the originator of the motion, supported it. The amendment was adopted unanimously by a rising vote.

A motion was discussed imposing a fine of $10 on members who failed to present an essay when assigned to them. Dr. Paaren amended the motion so as to allow an oral discourse instead. The amendment was finally adopted.

A motion was made to suspend the rules and change the time for electing officers from the annual meeting in the spring to the semi-annual meeting in November. The motion was carried.

It was also voted to hold all future meetings in Chicago.

The Association participated in a banquet.—*From the Prairie Farmer.*

NEWS AND SUNDRIES.

DISINFECTION.—The experimental evidence on record indicates that the following named disinfectants are the most generally useful, from a practical point of view: *Moist heat.*—A boiling temperature quickly destroys all known pathogenic organisms in the absence of spores. A temperature of 230° Fahr.—steam under pressure maintained for ten minutes, will destroy spores. *Chloride of lime.*—A four per cent. solution quickly destroys all micro-organisms, including spores. Labarraque's solution (liquor sodæ chlorinatæ,) is equally efficient when of corresponding strength. *Mercuric Chloride*, in aqueous solution, in the proportion of 1-10,000, is a reliable agent for the destruction of micrococci and bacilli in active growth, not containing spores; in the proportion of 1-1.000 it destroys the spores of bacilli, when they are fairly exposed to its action for a sufficient length of time (two hours). *Carbolic acid* cannot be relied upon for the destruction of spores. This agent is recommended for the disinfection of the excreta of patients with cholera (five per cent. solution). A two per cent. solution may be used for disinfecting clothing, etc. *Sulphate of Copper* is largely used as a disinfectant in France. It is efficient in the proportion of one per cent. for the destruction of micro-organisms without spores; for excreta, use a five per cent. solution. *Sulphurous acid gas* is the most useful gaseous disinfectant, and is mainly relied upon for the disinfection of ships, hospital wards, etc. It is important for the destruction of spores, and exact experiments show that its disinfecting power, as determined by biological tests, has been very much over-estimated.—*Science.*

INCREASE OF ANIMAL DISEASES.—The natural deduction is that so long as we must resort to slaughter, ample and uniform powers must be given and maintained throughout the States to condemn, kill and recompense. At the same time the most liberal government expenditure is demanded for investigations into causes and treatment of the diseases. The losses by swine plague alone during the last five months reach so far up into the millions that the paltry thousands expended by the National Cattle Com-

missioners and by the State Commissioners seem insignificant in the extreme. All that science, money and stern lawful authority can do must be invoked, or these losses will continue to multiply until a prominent national interest becomes paralyzed. Congress may well stop tariff tinkering and President-making, and look after the welfare of our great live-stock interestf, which are now threatened with dangers demanding instant attention.—*Prairie Farmer.*

SANITARY MEASURES.—The following resolution was very properly adopted by the Board of Live-Stock Commissioners of the State of Illinois, at its session, November 4th:

Whereas, It has been made known to the Commissioners that a considerable traffic in the carcasses of swine which have died from the effects of hog cholera is being carried on in this State, both over highway and railroads; and

Whereas, The best veterinary authorities are of the opinion that the said disease of hog cholera is transmitted and spread to a great extent by said traffic; and

Whereas, The law of the State of Illinois provides that "Any individual who shall knowingly sell, receive, convey, or engage in the traffic of diseased or exposed stock shall be guilty of a felony, and upon conviction thereof be imprisoned not less than one nor more than ten years in the penitentiary, and fined not less than $500 nor more than $5,000 for each and every offense, and shall become liable for any and all damage or loss that may be sustained by any party or parties resulting from exposure to said disease;" therefore,

Resolved, That the Secretary of this Commission be, and is hereby, instructed to notify all railroad companies doing business in this State of the dangerous character of the traffic herein referred to, warning them of the penalties of the law; also that he notify all veterinarians throughout the State that it is their duty to report to this Commission all violations of the statute herein quoted; also that he give to the press of the State a copy off this resolution, so that all persons may be informed as to the terms of the law.—*Prairie Farmer.*

THE VETERINARY PROFESSION IN THE UNITED STATES.—The question of veterinary colleges is one of great importance to the country and to the profession, and the danger that, in getting to recognize the diploma of graduation as an essential condition to

the practice of veterinary surgery, we may get to multiplying colleges until, as is the case with some of our numerous classical colleges, they become simply diploma mills, and the value of the diploma is so minimized as to make it hardly worth preserving. It will not do to let a course of lectures on veterinary subjects, *suitable* for *non-professionals*, *usurp* the place of a regular veterinary college course, under a competent faculty. The influence of our Agricultural and Stock Associations should be exercised to secure such legal recognition of the profession as will tend to encourage graduation at a leading veterinary college as a necessary antecedent to successful practice as official position. We do not want to encourage a multiplicity of veterinary colleges, but the establishment of a few, and the maintenance in these of a high standard of merit as a condition of graduation. By this means only can a diploma mean something.—*National Live Stock Journal.*

PROPHYLACTIC TREATMENT OF HYDROPHOBIA.—The following extract from a letter of Mr. Louis Pasteur, to Professor Jules Marcou, dated Arbois (Jura), France, Sept. 7, is kindly furnished us by Professor Marcou. "I take a great deal of pleasure in the thought that, on my return to Paris, I shall present to the Academy of Sciences an account of what I believe to be a very valuable prophylactic treatment against hydrophobia, applicable after the accident both to man and dogs. Do you not know same feature of this terrible disease which may be peculiar in America? Is it of frequent occurrence there? Remember that I should have the courage to apply my treatment even on persons who, after being bitten, had made the journey from Paris to America—although under these conditions at least two weeks must have elapsed since the accident—so great is my confidence in my method. However, I shall feel more sure of myself when I have made a large number of trials on man, which I shall do in 1885-'86. I have as yet made but one trial—on an Alsatian boy, whose mother brought him to me. He had been bitten horribly on the fourth of last July, and death by hydrophobia seemed unavoidable. Up to the present time I have excellent news of his health, although it is sixty-four days since the accident."—*Science.*

Loco.—A writer on *loco* says the plant is not poisonous. When cattle eat a quantity, it absorbs the juices of the alimentary canal, or dries them up. It then collects in the stomach and intestines as a dry mass, and the pressure on the circulation causes all the symptoms observable and finally produces death. The internal condition of cattle dying of this disease will verify this view.

Oxide of zinc, according to Prof. Peterson, of Kiel, is just as good as iodoform in the treatment of wounds, is not poisonous, is cheaper, and does not smell offensively.

Dr. Koch's Cholera Inoculation.— An exchange says Koch's "comma bacillus" appears to be having a hard time of it among the experts. First, Dr. Klein showed his contempt for it by swallowing it, and now Dr. Lancaster has the unkindness to say—first, it is not comma-shaped; second, it is not a bacillus; third, it does not always occur in the intestines of cholera patients, and fourth, there is no good evidence that inoculation with it produces cholera. In fact the poor thing appears to be about annihilated by its critics. Cholera, though, will remain undisturbed by it, and relentlessly claim its thousands of victims as heretofore.—*Medical Record.*

Reunion of Separated Members. — Dr. Klein, of the Austrian army, reports two cases of perfect reunion after separation of members, which clearly demonstrate that the preservation of separated members in alcohol is not the sole office of the surgeon in such accidents. Both cases referred to self-inflicted amputation of fingers (to avoid military service.) In one case union resulted in twenty-two days, in the other, where the finger was only found half an hour after the amputation, the cold and blue member grew warm on the second day, and had re-established its former relations completely within six weeks. Iodoform-gauze was used in both cases.—*Therapeutic Gazette.*

Costly Curs.—A correspondent of the New York *Tribune* says: There was once a people who worshipped the cat; we sacrifice to *the cur dog* 40,000,000 sheep annually. What a noble creature must be this cur dog! These 40,000,000 sheep

would supply all the wool we require, and, in addition to that from the sheep which the cur dogs kindly spare to us, would leave a good deal to sell abroad. What does the cur dog cost? Forty million sheep would produce $50,000,000 worth of wool and $50,000,000 worth of lambs. The cur dog, then, costs us in this way alone, $100,000,000 yearly, besides his food and the fowls and eggs he destroys, and the invaluble lives which are lost by reason of his bite and the dreadful hydrophobia. We laugh to scorn the ancient people who sacrificed to the neither harmless nor necessary cat, but we ourselves worship the savage, unrelenting dog and sacrifice our invaluable sheep to its bloodthirstiness.

DISINFECTANTS.—All the at present known agents of disinfection can be classed in three categories according to the nature of their action, viz.: the physical, physiological and chemical disinfectants.

As purely physical disinfectants rank dry heat and hot vapors. Both are powerful agents, but labor under the disadvantage of having but a limited applicability as to the area involved.

The physiological method is based on the supposition that the majority of infecting agencies are living organisms, and intends their destruction by drugs which prove poisonous to them without, in the quantity exhibited, injuring the human organism. The chief representatives of this group are the corrosive sublimate and the products of dry distillation, as carbolic acid. The sublimate is unfit for any extensive use on account of its powerfully poisonous action even in small quantities on man and animals whilst the carbolic products are not sufficiently energetic in their action.

The third group is formed by chlorine, bromine and sulphurous acid and owes its effects to a chemical decomposition of complex compounds. Bromine, especially in its vaporous form, has proved the most efficient of the three, especially for the disinfection of rooms and houses. It can be employed as a pure vapor, or mixed with air or steam. As a simple purifier of air in crowded apartments, ships, hospitals and barracks, bromine is the most eligible agent.— *Therapeutic Gazette.*

EXCHANGES, ETC., RECEIVED.

In addition to our usual exchanges of weekly, monthly and quarterly periodicals, from abroad and at home, and a large number of agricultural and scientific papers, we have received the following:

CATALOGUES AND PAPERS.—Annual Report of the Brooklyn Health Department; Tritis and its relation to the Rheumatic, by Dr. C. J. Lindy; The Descent of Man, by C. Darwin; First Annual Report of the State Veterinary Surgeon of Iowa; The Annals of the New York Academy of Sciences; Reports du Deuxiéme Congres National des Vétérinaires de France.

LETTERS AND COMMUNICATIONS were received from: W. Pendry, D.V.S.; C. B. Michener, D.V.S.; J. C. Meyer, Sr., V.S.; W. Bryden, V.S.; J. Scheibler, D.V.S.; W. Dimond, D.V.S.; C. C. McLean, V.S.; J. Hopkins, D.V.S.; A. D. Galbraith, D.V.S.; W. Conklin, D.V.S.

Several communications and reports, having reached us at too late an hour, have to be postponed until our next issue.

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Post Office orders to be made payable to A. LIAUTARD, Editor, through Station G. New York.

As we go to press on the 20th of the month, papers for publication ought to reach us before or on that date.